Sulfur, Se and Te abundances in chondrites and their components

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Sulfur, Se, and Te display similar geochemical properties. They are moderately volatile and chalcophile/siderophile. Relative to CI chondrites, S, Se, and Te are depleted in most inner solar system materials. Likewise, S-Se-Te are selectively depleted in the Earth's mantle relative to similarly volatile elements. Investigations of S-Se-Te abundances in different chondrite classes and their distribution among chondritic components can provide more robust reference paremeters and more insights into S-Se-Te fractionation processes at nebula and parent body conditions. Here, accurate and precise isotope dilution data for S, Se, and Te in carbonaceous (CC), ordinary (OC), enstatite (EC), and Rumuruti chondrites (RC) are presented. In general, bulk CC display CI-like S/Se ≈ 2500 and Se/Te ≈ 9. These values agree within error with the mean S/Se of 2600±700 and Se/Te of 7.9 ±1.6 suggested by [1] for the bulk silicate Earth. In contrast, most O, E, and R chondrites display much higher Se/Te which is caused by depletion of Te relative to Se. If the chalcogen element ratios inferred by [1] indeed reflect a late veneer contribution [1-3], then CC provide the best match among chondritic materials. To study the distribution and abundances of S-Se-Te among different components in Allende (CV3), Semarkona (LL3), and Indarch (EH4), a novel fs LA-ICP-MS method (Funk et al., *this meeting*) was applied. First results reveal that the more pronounced Te depletion relative to Se and refractory elements in the OC Semarkona relates to sulfide-metal assemblages interstitial to chondrules and that these assemblages control the budget of S-Se-Te in Semarkona. In the bulk rock of Allende, S-Se-Te display CI-like ratios and abundances are mainly controlled by sulfides and metals within the fine-grained matrix. A sulfide-rich rim around a chondrule-like object in the unfractionated CC Allende also displays the high Se/Te that we found in bulk chondrites other than the carbonaceous class. These results suggest that the Te depletion relates to the formation or thermal processing of sulfide-metal assemblages in different chondrites under different conditions and is likely related to chondrule formation.

[1] Wang & Becker (2013) *Nature* **499**: 328; [2] Rose-Weston et al. (2009) *GCA* **73:** 4598; [3] Yi et al. (2000) *J. Geophys. Res.* **105:** 18927.